

# The Level of Transformational change in Motor Skills Under the Influence of Swimming Program

<sup>1</sup> Faculty of Sport and Physical Education, University of Sarajevo, Bosnia and Herzegovina

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## Abstract

The main goal of this research is to determine the level of transformational change in motor abilities influenced by swimming program. The Sample of study were male students of the first and second years of primary studies, Faculty of Sport and Physical Education, University of Sarajevo, the academic year 2009/2010, age 20-22. In this study were tested 106 students, and study was conducted on a regular teaching of the subject swimming. The variables used to assess motor skills are the following: to assess coordinate (slalom with three medical ball, coordination with bat, backward polygon), to assess the factors speed (running at 20 meters high running start, side steps, hand tapping, foot tapping), to assess explosive strength (standing long jump seats, throwing a medicine ball from a seated position, jump up with spaces), to evaluate repetitive strength (chin-venture with the shaft, push-ups, lifting troops from lying), to assess the flexibility (flex, dorsal flexion of the foot, foot plantar flexion, inversion-internal-rotation supinatio, eversion-rotation, external-pronatio measured gravity protractor, retroflexion hand - extension, elevation posterior - no rotation of the upper arm). Application of discriminative analysis, it was concluded that the research program in this content, a favorable impact on the treated properties. The greatest impact of swimming with the student population in relation to other variables was the variable long jump. Also, there was concluded that when implementing the techniques of swimming there was a general development of motor skills..

Key words: **transformation, motoric skills, the swim, discriminative analysis**

## Introduction

The anthropological characteristics include anthropological variables, that variables describe human beings and therefore it follows that the state vector, obtained a description of a subject at a meeting of anthropological variables, a vector that defines the anthropological status of the entity. If the need arises and to determine the status of anthropological specified, it is understood that the team is defined with at least six different sets of variables and anthropological status: morphological characteristics, functional characteristics of organ systems, motoric skills, cognitive characteristics, conative characteristics and health sta-

## Sažetak

### **Nivo transformacionih promjena motoričkih sposobnosti pod utjecajem programa plivanja**

Osnovni cilj ovog istraživanja je utvrđivanje nivoa transformacionih promjena motoričkih sposobnosti pod utjecajem programa plivanja. Uzorak ispitanika činili su studenti prve i druge godine osnovnog studija Fakulteta sporta i tjelesnog odgoja, Univerziteta u Sarajevu, akademske 2009/2010. godine, starosti 20 – 22 godina, muškog spola. Uzorak je predstavljao 106 studenata, a istraživanje je provedeno na redovnoj nastavi iz nastavnog predmeta plivanje. Korištene varijable za procjenu motoričkih sposobnosti su sljedeće: za procjenu koordinacije (slalom sa tri medicinke, koordinacija sa palicom, poligon natraške), za procjenu faktora brzine (trčanje na 20m visokim startom, koraci u stranu, taping rukom, taping nogom), za procjenu eksplozivne snage (skok u dalj iz mjesta, bacanje medicinke iz sjedećeg stava, skok uvis s mjesta), za procjenu repetitivne snage (zglobovi na vratilu sa pothvatom, sklekovi, podizanje trupa iz ležanja), za procjenu gipkosti (iskret, dorzalna fleksija stopala, plantarna fleksija stopala, inverzija-rotatio interna-supinatio, everzija-rotatio externa-pronatio mjerena je gravitacionim uglomjerom, retrofleksija ruku - extensio, elevatio posterior - bez rotacije nadlaktice). Primjenom diskriminativne analize došlo se do zaključka da je program istraživanja svojim sadržajem, povoljno djelovao na tretirane karakteristike. Najveći utjecaj programa plivanja kod studentske populacije u odnosu na druge varijable bio je na varijablu skok u dalj. Prilikom realizacije programa plivačke tehnike došlo je i do općeg razvoja motoričkih sposobnosti.

Ključne riječi: **transformacija, motoričke sposobnosti, program plivanja, diskriminativna analiza**

tus of the individual. In sports and physical education are taught that motor skills were multidimensional, because one tends to round development of their potential. Motor skills, as a prerequisite for quality performance sports technique, are so important for other daily living needs. Thanks to the development of mathematical and statistical methods, algorithms, especially computer technology, it has allowed a detailed study of the emergence of a large number of elements in the interaction. All phenomena can be seen as multilateral including motor skills and other changes related to the development of science and contributed to a different approach to the classification and systematization of human movement. Swimming, can also be affected by

the level of development of motor skills, but the adoption of the swimming technique to a level where they can act on the motor skills is a very complex, so it takes a longer period of time to work on raising awareness of swimming technique, which only adopted when the quality (level specialization and automation) can act to increase motor skills. Until then, activity and inactivity of muscle is not synchronized, so that in this period, more swimming takes place in anaerobic conditions and the development of motor skills is the best possible level (Wertheimer and Zoretic, 2010.). That the alleged influence of swimming on motor skills and research confirms the obvious, like Rater's research (1997) is a sample of 109 students from the Faculty of Sport and Physical Education, which stated that "the function of success in swimming, the variables of coordination, explosive and repetitive strength, speed, flexibility and speed of the nerve-muscle reaction. "Had the motor skills important for the achievement of the results, which in turn depends on the program prepared for the gradual training of those physical properties that are dominant in achieving the maximum or competing achievements demonstrated in his research with Olbrecht (2000), Sweetenham and Atkinson (2003) Milišić (2003) Bompá and Carrera (2005). That research, based on current knowledge and results of research in basic motor skills give us conclusion that the entire system of the variables has a significant statistical correlation with swimming (Jorgić et al. 2010, Abe et al., 2006.). In this study, whose primary goal is to determine the level of transformational change in motor abilities under the influence of swimming, it is sufficient to note that the successful implementation of these transformations affect indisputable and morphological characteristics, functional ability and cognitive - conative components that contribute to the formation of an optimal individual style that is later, a significant effect of motor transformation (Volčanšek, 2002). All these studies have standardized tests, such as in this study used simple tests (Leko, G. and N. Grcić-Zubčević, 2004). These tests checked transformation under the influence of motor abilities of swimming, which was the main goal of this research.

## Methods

### Sample of respondents

A sample of this study consists of male students, the first and second years of basic studies, Faculty of Sport and Physical Education, University of Sarajevo in the academic 2009/2010. aged 20-22 years. The sample was selective degrees criteria for admission to the Faculty of Sport and Physical Education, University of Sarajevo. The sample included 106 students, without any distinct morphological and locomotor defects. The study was conducted on a regular teaching of the subject swimming. All patients had optimal conditions for regular attendance, which was one of the prerequisites for the implementation of this research.

### Sample of variables

Basted of the structure of motor skills that are defined Kurelić et al. (1975), in the present study were to assess the motor abilities of the selected variables found to cover an area of latent dimensions of perceiving and energy regulation, are also present in swimming. In order to facilitate the procedure when processing test results are coded so that the first letter indicates the motor area, the other two belonging to a certain latent dimension, while the last three letters indicate nominal characteristics of the measuring instrument. Psychometric characteristics of the variables can be found in research (Momi, Štalec and Wolf, 1975).

For the assessment of coordination were used the following tests:

- Test - MKOS3M, slalom with three medical balls,
- Test - MKOKOP, coordination with bat,
- Test - MKOPOLN, polygon backwards.

To estimate the speed of the factors we used the following tests:

- Test - MBR20V, running the 20m high start point,
- Test-MBRKUS, side steps,
- Test - MBRTAR, hand tapping,
- Test - MBRTAN, foot tapping.

To estimate the explosive power used the following tests:

- Test - MESSDM, standing long jump seats,
- Test - MASBMSS, throwing a medicine ball from a seated position,
- Test - MESSUM, jump up with the place.

To estimate the repetitive forces were used the following test:

- Test - MRSZGP, chin on the shaft with the enterprise,
- Test - MRSSKL, push-ups,
- Test - MRSPTL, raising troops from lying.

For flexibility assessment used the following test:

- Test - MFLISK, flex,
- Test - MFLDFS, dorsal flexion of the foot,
- Test - MFLPFS, plantar flexion foot
- Test - MFLRIS, inversion-internal-rotatie supinatio,
- Test - MFLREP, eversion-rotatie external-pronatio measured gravity protractor,
- Test - MFLRFR, reflexion hand - extension, ELEVATIO posterior - no rotation arm.

### Methods for processing data

Data processing was performed on the multivariate level. As a method for determining the transformation process was applied discriminant analysis.

## Results and Discussion

The forgoing tables presented discriminative standardized coefficients and standardized coefficients participation variables in research space in the formation of significant discriminant functions of the central group of the important function.

Boxes-their M-test, Table 1, to test the similarity matrix of covariance between initial and final measurements in the area of motor skills. The difference between the covariance matrix is statistically significant (sig, 000), and allows access to the further procedure of discriminant analysis

Table 1. Boxov M-test

Box's M		479,136
F	Aproks.	2,285
	df1	190
	df2	135048,447
	Sig.	,000

Reviewing the results presented in Tables 2 and 3, treated with discriminant analysis feature, it can be seen that the obtained one significant discriminant function whose coefficient canonical discrimination (856 Personnel), indicating that the association between a set of data based on the appropriateness of which was done by discriminant analysis and results of the discriminant function. Significance was sig = .000, and Wilks lambda = ,268th Given the amount of Wilks lambda we can conclude that the correlation properties of treated statistically high. Based on the centroid groups (Table 6), the structure matrix shows that the better the outcome measurements (initial or final) if rezultatio have a negative sign, then they are better in the final measurement.

Table 2. Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	2,731	100,0	100,0	,856

Table 3. Wilks' Lambda

Test of Function	Wilks' Lambda	Chi-square	Df	Sig.
1	,268	264,017	19	,000

Based on the obtained results, shown in Table 4, Standardized Canonical Discriminant Function Coefficients, it is evident that between the initial and final measurements isolate the following variables: taping hand - MBRTAPR (-, 135), foot tapping - MBRTAPN (-, 218), long jump from a place - MESSDM (-, 414), throwing a medicine ball from a seated position - MASBMSS (-, 220), vertical jump from a place - MESSUM (-, 158), chin on the shaft with venture - MRSZGP (-, 256 ), inversion-internal-rotatie supinatio - MFLRIS (-, 179), dorsal flexion of the foot - MFLDFS (-, 065) and raising troops from lying - MRSPTL (-, 001).

Table 4. Standardized Canonical Discriminant Function Coefficients

	Function 1
MKOS3M	,241
MKOKOP	,192
MKOPOLN	,529
MBR20V	,113
MBRKUS	,158
MBRTAPR	-,135
MBRTAPN	-,218
MESSDM	-,414
MASBMSS	-,220
MESSUM	-,158
MRSZGP	-,256
MRSSKL	,009
MRSPTL	-,001
MFLISK	,072
MFLDFS	-,065
MFLPFS	,272
MFLRIS	-,179
MFLREP	,189
MFLRFR	,042

Table 5. Structure Matrix

	Function 1
MESSDM	-,482
MKOPOLN	,469
MASBMSS	-,455
MKOS3M	,440
MBRTAPN	-,396
MBRTAPR	-,355
MBR20V	,351
MBRKUS	,347
MRSZGP	-,309
MRSPTL	-,254
MKOKOP	,231
MFLDFS	-,227
MESSUM	-,223
MFLISK	-,221
MRSSKL	-,191
MFLREP	-,186
MFLRFR	-,163
MFLRIS	-,128
MFLPFS	-,071

Table 6. Group Centroids

GROUP	Function 1
Initial	1,645
Final	-1,645

Based on correlation by discriminative function (Structure Matrix) Table 5, we find the variables that indicate the maximum difference between the initial and final measurements of motor skills. These are the tests: standing long jump seats - MESSDM (-, 482); backward polygon - MKO-POLN (, 469), throwing a medicine ball from a seated position - MASBMSS (-, 455); slalom with three medicine ball - MKOS3M (, 440); foot tapping - MBRTAPN (-, 396); hand tapping - MBRTAPR (-, 355), running on a 20m high start - MBR20V (, 351), side steps - MBRKUS (, 347); chin on the shaft with the venture - MRSZGP (-, 309), to raise troops from lying - MRSPTL (-, 254); coordination with bat - MKOKOP (, 231); dorsal flexion of the foot - MFLDFS (-, 227), vertical jump from a place - MESSUM (-, 223), flex - MFLISK (-, 221); pushups - MRSSKL (-, 191); eversion-rotatie external-pronatio measured gravity protractor - MFLREP (-, 186); reflex hand - extension, EL-EVATIO posterior - no rotation arm - MFLRFR (-, 163), inverse-rotatie internationalized supinatio - MFLRIS (-, 128), and the foot plantar flexion - MFLPFS (-, 071). According to Okičić (1999) at the age of 8-12 years children are best overcome all kinds of movement and fastest swimming acquire motor skills.

The data obtained in this study can be divided into three basic levels: results of which proved to be of high, medium and low statistical value. When the impact of swimming on motor skills are with high statistical value then includes the following motor areas: coordination, speed factor and the most explosive strength. It says that the program to be applied to the Faculty of Sport and Physical Education, when it comes to swimming has the greatest impact on the explosive force. By the results of the statistical mean value, the swim has affected to a complete set motor areas which already shows that swimming has a positive effect on the entire motor system. Also, the results with low statistical value are mainly from space flexibility, and it is known that the pliability is not genetically innate, but must acquire by training, so it can be concluded that in addition to swimming and partly other subjects had their effect on these results.

Based on the information, the data shows that the results given for the right to conclude the following: students in the final measurements have better results, which means that the program of swimming classes are giving results. The results obtained through this program are similar to the experimental results in the study conducted (Born, 1997). Studies have shown that there has been a significant transformation of motor skills in students affected by swim programs. Also, the other researchers (Majceková, Yi et al 2008, Silic, Grcic-Zubčević, Brekalo, 2007) have come up with similar findings on the transformation and scale - the relationship between motor skills and coordination skills in swimming younger swimmers with different knowledge and skills of swimming.

## Conclusion

The main objective of this study was to determine the influence of the level of transformational change in motor abilities influenced swim programs. The study was conducted with students of the first and second years of primary studies, Faculty of Sport and Physical Education, University of Sarajevo, the academic 2009/2010, aged 20-22 years, male. In the sample of 106 students, with doesn't have a distinct morphological or locomotor defects, in this study was conducted that the research program in this content, which was structured on the basis of such a favorable impact on the characteristics of the treated. The greatest impact of swimming with the student population in relation to other variables was the variable long jump, which means that the program has a positive impact on the explosive force. When implementing the techniques of swimming there was a broad development of motor skills. Also, a part of achieving progress in raising motor skills belong to the realization of practical instruction in other subjects at the Faculty of Sport and Physical Education. Variables which manifested a positive result are: backward polygon, throwing a medicine ball from a seated position, foot tapping, hand tapping, chin on the shaft with the venture. All this leads to the conclusion that this swimming program positively affected the entire musculature Faculty of sport and physical education. This is another proof that swimming has a positive effect on the entire musculature of a man and that definitely, when you stay in the water and practicing the techniques of swimming, there is equal development of complete motor skills man. Swimming is a basic sport that has the best impact on the entire man's muscular.

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Correspondence to:

**Edin Mirvić**

Faculty of Sport and Physical Education, University of Sarajevo

Patriotske lige 41, 71 000 Sarajevo

Bosnia and Herzegovina

Phone: +387 33 668-768

E-mail: edinmirvic@gmail.com